What treatments best control economically-damaging canola insect pests?

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Canola insect pests have increased in the Golden Triangle, in particular, the cabbage seedpod weevil and the crucifer flea beetle.

“These two economically damaging canola insect pests can affect yield and grain quality,” said Dr. Gadi V.P. Reddy, entomologist at Montana State University’s Western Triangle Ag Research Center, based in Conrad.

Lygus bugs also affect the canola crop at harvest time, but haven’t economically affected canola production yet. However, the lygus bugs are invading Canada’s canola fields, and could come down in more invasive numbers in the near future.

Reddy and Anamika Sharma, WTARC post doc research associate in entomology/insect ecology, want to find the best way to treat canola crop pests, and that may be a combination of insecticides and biostiticides.

“So far, we are finding a combination of treatments works best to fight these insects. It also has to be economically feasible for producers – for instance, biostiticides alone can be very expensive,” Reddy said.

He explained their experiments indicated that combining two biostiticides had an additive or synergistic effect against insect pests.

“This way, we can reduce the doses and thus, lower application costs,” he added.

In 1999, cabbage seedpod weevil levels were low during the growing season in Fergus County. By 2013, scientists were finding high levels of cabbage seedpod weevils and crucifer flea beetles in both canola and mustard crop fields in the county.

Insecticide seed treatments are usually applied, but may not be enough to control insects.

“Everyone here protects their crop with neonicotinoid seed treatments but they don’t protect the plants after the first 25 to 30 days,” Reddy said.

Anamika said they conducted two years of canola pest trials with insecticides, biostiticides, such as predatory nematodes, and fungal treatments, along with a nitrogen fertilizer trial to find out what worked best to control these pests.

Predatory nematodes can attack the cabbage seedpod weevil.

Fungal treatments can recycle and stay in the soil. For example, Reddy said Beauveria brongniartii is one fungus that stayed in the soil for 14 years in the soils in Switzerland. They are conducting another study this year.

The initial study in 2016 evaluated biostiticides.

“We used low risk biostiticides and predatory nematodes to find out which one worked better on the insects,” she said.

There were seven biostiticide treatments, which were compared to the action of imidacloprid (or Gaucho 600) seed treatment.

“We found a combination of biostiticides and nematodes worked best, and were compatible with the seed treatment,” Anamika said.

In 2017, they conducted fertility dryland studies with nitrogen fertilizer applications at Sweetgrass, an off-station location close to Canada, and the Conrad on-site location.

“Nitrogen fertilizers improve the plant structure and defense metabolites, so the plant has the ability to fight off pests,” she said.

However, in some instances, nitrogen can also cause a higher infestation of insects.

“The trichophot (ecological impacts of three trophic levels on each other) interaction of canola, nitrogen and insects is complex,” she added.

It was hard to determine the insect damage levels because it was a dry year.

“The relationship between the nitrogen level and insect feeding damage was difficult to tell because of the low rainfall growing season,” Anamika said.

Anamika Sharma, WTARC post doc research associate in entomology/insect ecology, looks for insects in the newly emerging canola fields at WTARC.

Weather data at the nearest weather station from April-August showed that both locations experienced dry conditions in the mid- to late growing season.

Average monthly precipitation at Conrad for June was 4.9 inches of rain; for July, 0.9 inches; for August, 0.26 inches.

Average monthly precipitation at Sweetgrass for June was 5.2 inches of rain; for July, 2 inches and for August, 0.4 inches.

In a more normal rainfall year, the results would be clearer.

The goal of the 2017 study was to determine the feeding impacts of flea beetle and cabbage seedpod weevil on canola seed yield and quality with respect to nitrogen soil fertility and insecticide seed treatment.

There seems to be three pests that can impact canola production, cabbage seedpod weevil, crucifer flea beetles and lygus bugs, but the 2017 study mainly focused on the first two insects.

The pests populate the fields at different times, but there is some overlap in populations.

“At one location, cabbage seedpod weevils were causing more damage at the same time as flea beetles were causing damage at another site,” she said.

In addition, environmental conditions change from year to year, which impacts trials.

The treatments consisted of four levels of N applications, including: no N or seed treatment applied, 50 pounds/acre of N with seed treatment, 100 pounds/acre of N with seed treatment and 150 pounds/acre of N with seed treatment, put down at the time of canola seeding.

At seeding, all plots received 20 pounds of phosphorus, 20 pounds potassium and 20 pounds sulfur per acre.

Based on the soil tests, residual N level was about 16 pounds/acre at Conrad compared to 3.5 pounds/acre at the Sweetgrass location.

Experimental plots at Conrad were seeded on May 1 and at Sweetgrass on May 6.

Each plot was rated for flea beetle feeding injury at the cotyledon, four leaf, pre-flowering and pod formation stages.

Cabbage seedpod weevil damage assessments were conducted on the pods at the pod

CANOLA PESTS: Continued on page 25
CANOLA PESTS: Continued from page 24

Producers may also be able to use a lower level of foliar insecticides.
Conventional chemical insecticides can by sprayed three times during the growing season for pests, and perhaps, growers will be able to cut down on the number of foliar applications if they use them in combination with biostatements,” she said.

In the future, Dr. Reddy said WTARC plans to work more on trap crops, pheromones, parasitic wasps that attack the cabbage seedpod weevil and crucifer flea beetle, and other biopesticides, as well as other pest management controls. ★

mature stage only.
Pods were randomly sampled per plot. Those pods that were damaged as seen by feeding holes, were opened in the lab to check for the presence of larvae inside the pods.
“Study results showed that flea beetle feeding pressure based on crop injury ratings was very high throughout the canola growing season at Conrad as compared to the Sweetgrass location,” Anamika said.
More than 70 percent injury was recorded at canola’s four-leaf stage in Conrad while the highest injury ratings were about 11 percent at canola’s four-leaf and preflowering stages at the Sweetgrass location.

At Sweetgrass, where the flea beetle feeding pressure remained low during the entire growing season, injury ratings varied among the N levels at the cotyledon stage - but not during the other crop growth stages.
Insecticide significantly impacted the feeding injury ratings at cotyledon and pre-flowering stage.
Interactions between N levels and insecticide treatment for flea beetle feeding injury was not significant at either location.
There were lower average cabbage seedpod weevil infested pods at Conrad (ranging from 5-13 percent) than at Sweetgrass, where number of infested pods were high, ranging from 6-26 percent.
No significant differences were observed among insecticide treated and untreated plots at both of the locations.

Although yields increased slightly with the increase in N level, with the highest at 100 pounds/acre N level, differences were not significant among the N levels at the Conrad location.”

No significant differences were noted among the N levels for the grain quality parameters.

At Sweetgrass, where flea beetle pressure was low, the impacts of N levels were more pronounced compared to the Conrad location.
Significant differences were noted among the N levels for canola yield, test weight and percent oil content.
Yield levels increased with the increase in N application, with the highest average yield (11.4 bushels/acre) at the 150 pounds/acre N rate.

“Overall, the studies demonstrate that if dry and warm conditions prevail over the canola growing season, significant damage can occur - even at the later stages of canola development. That impacts both the yield and the grain quality parameters,” Anamika said.
Although, yield was highest at the 100 and 150 pounds of N per acre treatment levels, flea beetle injury pressure likely masked any statistical differences among them.
Because of the overlap in insect populations and environmental factors last year, where scientists were unsure of what was causing damage to the canola crop, the project is continuing this spring.
In 2018, the study will include insecticidal foliar treatment, seed treatment and biostatements.

The scientists want to see which combinations of treatments work best in providing the best control for all the insects at the same time.
“This year, we are also looking at how the three insects (but mainly cabbage seed pod weevil and flea beetles) overlap in their popula-